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SCIENCE AND TECHNOLOGY

No. 118



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CHINA REPORT
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APPLIED SCIENCES

BCM-2 MINICOMPUTER DEVELOPED

Beijing BEIJING RIBAO in Chinese 18 Jul 81 p 2

[Text] The Beijing Computer Research Institute has recently successfully developed the BCM-2 minicomputer capable of processing Chinese characters. This multi-purpose, easy-to-operate computer may be used in science, communications, medicine, national defense and business management. A small number of the BCM-2 minicomputer has already been produced.



A technician operating the Chinese character output.

CSO: 4008/425

APPLIED SCIENCES

BRIEFS

DJS-140 HIGH SPEED COMPUTER DEVELOPED--Recently, the DJS-140 electronic digital computer was successfully developed by the Beijing Computer Plant No 3. Having passed product assessment, a number of this computer model will be put into production. Designed jointly by units of the Fourth Ministry of Machine Building, the DJS-140 is a high-speed model of the 100 series computers produced by the PRC. Compared with other models from the 100 series, the DJS-140 is characterized by a high rate of operations capable of reaching 800,000 calculations per second; it is functionally complete, has 9 types of peripheral equipment, a variety of software systems and a large capacity internal memory unit. Useful in a wide range of applications in industry, agriculture, national defense and scientific research, this computer is ideal for performing scientific calculations, data management and real-time controls. The testing unit of the assessment committee examined the overall computer system and the resulting calculations of all test questions were the same as those of comparable types of foreign computers. As of 16 April, this computer has been in operations for 600 hours without any malfunctions which exceeded the 200 hour continuous operation testing requirement. At present, this computer is still in continuous and stable operations. [Text] [Beijing BEIJING RIBAO in Chinese 11 Jun 81 p 1]

CSO: 4008/426

LIFE SCIENCES

REPORT STATES CHINA AMONG WORLD LEADERS IN BURN TREATMENT

Beijing GUANGMING RIBAO in Chinese 24 Jun 81 p 1

[Article by Qiu Yunde [6726 0061 1795] Zhsng Yifu [1728 6318 1788]]

[Text] The reporters learned at the International Burns Discussion Meeting held on 21-23 June in Shanghai that since the successful rescue of the burn victim Qiu Caikang [6726 6299 1660] in 1958, the work of research and treatment of burns in China has continued to be progressive and creative and China has been among the most advanced ever since.

For a long time, the burn treatment centers and research organizations in the various provinces and cities of China have carried out clinical studies and theoretic research on key problems of treatment of burns, and have created unique methods of treatment and individual viewpoints in theory. For example, the Department of Burns of Ruijin Hospital of Shanghai Second College of Medicine conducted more than 10 years of research on the treatment of large area third degree burns (burns are divided into the first, the second, and the third degrees; the third degree is the most serious.) Through the use of various special methods the problem of using a small amount of autograft to cover about 90 percent third degree burn areas was resolved. This is an extremely difficult problem. After a large area of the victim's own skin has been burned, serious rejection problems will occur, if allografts are used for transplants. In order to overcome this difficulty, China's physicians combined clinical observations with pathological studies of transplants with a mixture of autografts and allografts. They discovered some very strange phenomena [sic]. Through the adoption of certain measures, they preliminarily resolved the problem of rejection in case of allograft for large area third degree burn victims. Under the condition of relative scarcity of allografts, the People's Liberation General Hospital, the Ruijin Hospital, etc., inspired by the successful foreign experience of using pigskin to make a biotic ointment, applied pigskin as a substitute for allograft to be mixed with autograft for transplant and successful results were obtained.

As the technique of surgical approach to burns was continuously improved, the rate of cure for large area burn victims in China rose continuously, so that some extremely large area burn victims who would have to be regarded as completely hopeless were rescued. In 1977, Ruijin Hospital successfully rescued 100 percent of

burn areas [sic]. Of these Yang Guangming [2799 0342 2494], a victim of third degree burns over 94 percent of his body was the first successful recovered case ever reported in the world. Hospitals of other provinces and cities also saved many difficult-to-cure burn victims. For example, the First Hospital of Beijing College of Medicine successfully treated cases of 98 percent burned areas. One victim, a young woman by the name of Wang Shifen [3769 0013 5358], suffered third degree burns over 88 percent of her body, and was one of those who recovered. At Beijing Jishuitan Hospital 2 victims of 3D degree burns over 90 percent of their bodies recovered. One of the 2 was a 2-year old child who suffered 3D degree burns over 94 percent of the body. At the Third Military University of Medicine, more than 70 percent of the total burn cases treated recovered. Of victims of 3D degree burns above 50 percent of the body, the recovery rate reached 60 percent. In such places as Harbin, Tianjin, etc. more than 70 percent of 3D degree burn cases also recovered.

On the International Burns Discussion Meeting, burns specialists, plastic surgery specialists, and scientists coming from China's 19 provinces (cities) exchanged experiences and investigated and discussed clinical work, basic theory, and plastic restoration with specialists and scientists from the United States, Japan, Yugoslavia, Australia, and Hong Kong.

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CSO: 4008/400

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- [Text] The Calculation of Metallic Structure Vibration for
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[2455 2415 0534], both of the Shanghai Harbor Machinery Plant;
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1813], Zigong Transportation Machinery Plant, Sichuan (32)
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CSU: 4008/408

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[Text] Design and Research

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Chip Conveyor.....Zhang Qicheng [4545 0796 2052], Qinghua
University

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Power-adjusting and Leakproof Design of the Ram of Slotting
Machine Model BAS063.....Fu Jingrong [0265 2529 2337],
Fushun Machine Tool Plant

(5)

Enclosed Norton Mechanism.....Gu Jianhua [7357 1696 5478],
Shanghai Machine Tool Factory No 11

(7)

Transmission Error Compensation for CNC Open-loop System
.... Wang Feilong [3769 7378 7893], Huazhong Institute of
Technology

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Tool Plant No 2

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of Machine Building

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[2733 2837 5407], Beijing Institute of Electromechanical Devices

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7703] and Yao Zhenqi [1202 2182 6386], both of the Beijing
Machinery Plant

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CSO: 4008/405

Aeronautics

AUTHORS: QIAN Xuesen [6929 1331 2773] et al.

ORG: None

TITLE: "Views of China's Top Scientists During Session of Scientific Council of Chinese Academy of Science"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese Jul 81 pp 2-5

ABSTRACT: In May 1981 the Chinese Academy of Science held its fourth conference of the Scientific Council in Beijing. The conference was attended by 400 council members who represent the top scientific talents in China. The views expressed by some of the key speakers are as follows: 1) Qian Xuesen [6929 1331 2772] spoke on the importance of developing management science to attack the many social problems facing China today; 2) Li Yinyuan [2621 5593 6678], Guan Weiyan [4619 1602 3508], Zhang Zong [4545 4844], Hong Chaosheng [3163 2600 3932], and Li Lin [2621 2651] jointly discussed the importance of solid-state physics research and its potential impact on national economy and defense; 3) Su Buqing [5685 2975 7230] suggested the application of mathematics in various production processes; 4) Shi Changxu [1597 2490 4872] spoke on the importance of developing new

[continuation of HANGKONG ZHISHI Jul 81 pp 2-5]

materials and research in material science; 5) He Zehui [0149 3419 1979] talked about the proper attitude of self-confidence and perserverance in pursuing scientific research; 6) Li Xun [2621 5651] encouraged Chinese scientists to devote efforts in technology research as well as basic research; 7) Zhang Wenyu [1728 2429 5940] emphasized the importance of experimental research as the foundation of theoretical science; 8) Wu Zhenkai [0702 1767 6963] suggested improvements in the living standards for middle-aged scientists in China so they can devote all their efforts to scientific work.

AUTHOR: DONG Tien [5516 1131]

ORG: None

TITLE: "The Highly Mobile Small Air Cushion Boat"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese
Jul 81 p 14

ABSTRACT: The small air cushion boat is typically 3 to 4 meters long, over 1 meter wide, and weighs less than 200 kg. Because of its small size, light weight, and high mobility, it is often used as a short range emergency vehicle traveling between off-shore islands, in swamps, or along winding rivers. Small air cushion boats are also used by military and police units for high speed transportation. The relatively simple structure of small air cushion boat makes it feasible for individuals to design and construct the boat or to assemble it from available parts.

AUTHOR: YUAN Hang [6678 5300]

ORG: None

TITLE: "Space-Based Radar"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese
Jul 81 pp 20-21

ABSTRACT: Space-based radar has been proposed in recent years as part of an early warning system to detect low-flying enemy airplanes or cruise missiles. In order to achieve continuous coverage and to direct concentrated microwave energy through a narrow beam for target tracking and detection, a large antenna must be placed in an earth-synchronous orbit. To install such an antenna requires the use of a space shuttle as the transporting vehicle. Typically, a space-based radar uses a phased-array antenna whose beam can be steered electronically by an onboard computer. In addition to air defense applications, a space-based radar can also be used for air traffic control, soil temperature measurement, and as part of a communication network.

AUTHOR: PU Linfa [3184 2651 4099]

ORG: None

TITLE: "Laser Boresighting"

SOURCE: Beijing HANGKONG ZHISHI [AEROSPACE KNOWLEDGE MAGAZINE] in Chinese
Jul 81 pp 28-29

ABSTRACT: Boresighting is a procedure of aligning the axes of airborne weapons and fire control systems with the airplane axis so they meet strict design tolerances. In this article the basic principles of the conventional optical boresighting technique is introduced and its disadvantages are pointed out. The newly developed laser boresighting technique and how it achieves improved alignment precision are explained. It is also pointed out that by using laser boresighting and improving the quality control in weapon manufacturing and assembly, considerable savings in ammunition can be realized by eliminating actual boresight testing.

3012

CSO: 4009/388

Armaments

AUTHOR: WAN Daozheng
WANG Changwen

ORG: None

TITLE: "The Synthesis and Properties of N-(2,2,2-Trinitroethyl)-N-Nitro Amino-ethanol Nitrate"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, May 81
pp 20-23

TEXT OF ENGLISH ABSTRACT: The above compound was first published in 1961 in USP by Henry Feuer, who synthesized its intermediate by the "Mannich Reaction" of nitroform, aminoethanol and formaldehyde. In China it was obtained by other methods in 1962. All of these researchers considered it an unstable, useless explosive.

We have found that it can be synthesized by the Mannich-Nitrosation reaction to increase its yield and recrystallized from dilute NH_3 to improve its stability. The data of the properties of this pure compound, the thermal-hydrolytic stability and detonation properties show that the compound remains a valuable explosive if it is used under certain conditions.

AUTHOR: MA Baohua

ORG: None

TITLE: "The Optimization Design of the Fuze Helical Spring"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, May 81
pp 24-32

TEXT OF ENGLISH ABSTRACT: This paper discusses a method of the optimum design of the cylindrical helical compression springs used in fuzes. By using the regression analysis method, a regression equation of σ_b-d of special purpose carbon spring steel wires and a regression equation of the Wahl factor-spring index have been established. Based on fully stressed criteria, a mathematical model for spring optimization design has been built. The model is a constrained nonlinear programming problem. Considering that the diameter of the steel wire is discrete, the problem can be worked out with a direct search method and the program is made in FORTRAN.

This method was used to redesign the existing fuze springs under similar initial conditions. It has been proved that this method is better than the traditional ones.

AUTHOR: DONG Yongzhong
CHEN Tingfen

ORG: None

TITLE: "Experimental Research on the Vertical Penetrating Process of High Velocity Long Rod Armor-piercing Projectiles"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, May 81
pp 36-47

TEXT OF ENGLISH ABSTRACT: Through experiments conducted with high velocity long rod APDS vertically impacting the thick homogeneous metal plates, this paper analyzes the fracture process of the penetrator and plate during penetration and the influence of the penetrator material microstructures and properties on the process, and presents some high-speed laser photographs during penetration and some pictures of the adiabatic shear bands and metallic flow lines in the residual bodies of the penetrator and the plates. In the experiments, not only the muzzle velocity and the impact velocity of the projectiles, but also the sizes of the holes and the plastic deformation regions around the hole are measured. Finally this paper presents a suggestion for the design of the armor-piercing projectiles and the choice of its materials.

AUTHOR: JIANG Haozheng
LIU Naisheng

ORG: None

TITLE: "Experimental Research of Effective Analog Simulation of Shaped Charge Warhead with Hemispheric Large Diameter Liner"

SOURCE: Beijing BINGGONG XUEBAO [ACTA ARMAMENTARII] in Chinese No 2, May 81
pp 48-57

TEXT OF ENGLISH ABSTRACT: This paper uses the law of geometric similitude to perform experimental research on analog simulation for a large diameter shaped charge warhead with hemispheric liner, obtaining the regularity of penetration depth L, diameter D of the surface and hole volume V of targets at various stand-off H. Based on the experimental values, this paper, in considering various influential factors, derives useful empirical formulas of effective calculation of shaped charge warheads with hemispheric liner.

9717
CSO: 4009/360

Construction

AUTHOR: ZONG Benmu [1350 2609 2606]
HUANG Youfeng [7806 2589 0023]

ORG: Both of Bureau of Cement, Ministry of Construction Materials

TITLE: "Strengthen Equipment Management and Improve the Level of Equipment Management"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, 10 May 81 pp 2-4

ABSTRACT: Equipment management is an important part of managing an enterprise. It is the precondition if the enterprise is to realize good quality, low cost, safe, and balanced production to guarantee the completion of the State's plan. In order to manage the equipment well, the work should include the following aspects, the paper maintains: (1) Planned inspection and repair of the equipment should be strengthened; (2) Efforts should be given to the research on techniques of early forecast, inspection and monitoring of deterioration and damage of equipment and its parts; (3) Carry out work of simplification, serialization, and standardization of types and parts specifications of cement equipment; (4) Perform good basic work of equipment management, including record keeping, setting up quality standard for inspection and repair work, and maintaining complete sets of drawings of the equipment.

AUTHOR: WANG Yueke [3769 2574 0668]

ORG: Jinan Cement Plant

TITLE: "Several Viewpoints in Improving the Quality of Standing Kiln Cement"

SOURCE: Beijing SHUINI [CEMENT] in Chinese No 5, 10 May 81 pp 28-32

ABSTRACT: Quality instability of clinker is a common problem in today's standing kiln cement production. The paper discusses this problem in the following 10 aspects: (1) The effect of the ratio of height to diameter of the kiln on the clinker quality depends upon many other factors; (2) Enlargement of the opening also depends upon other conditions; (3) Height of kiln cover and chimney is important; (4) Composition of the mixture should be reasonably chosen; (5) A low iron mixture should be investigated; (6) The raw material should be as homogenous as possible. (7) The fuel affects the quality of the clinker; (8) A stable ratio of coal to raw material improves the stability of granulation of the clinker; (9) Quality management measures guarantee the quality of the cement product; (10) Work procedure parameters should be adjusted when the standard for the soil processing method (mainly the quantity of water used will be different) becomes official on 1 Jan 80.

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CSO: 4009/380

Metallurgy

AUTHOR: TANG Renguang [0781 0088 0342]
WANG Hongyin [3769 1347 0603]
MA Xinqing [74560207 7230]

ORG: All of Zhengzhou Research Institute of Machinery

TITLE: "Research on Ion Carburization Technology"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 5, 81
pp 1-6

ABSTRACT: Experiments of ion carburization was carried out with 3 types of steel: 20, 18CrMnTi, 20Cr at varying parameters of time, temperature, duration, and current to study the quality of the carburized surface. Results demonstrate that ion carburization is a heat treatment technique of high efficiency, high quality, low energy consumption, and nonpolluting. Problems concerning the ion carburization speed, concerning the quality of the carburized surface layer, concerning the advantage or disadvantage of adding a heater, and concerning the method of saving energy are discussed. The experimental procedure and results are analyzed and reported.

AUTHOR: TANG Jixu [0781 49494872]
OU Jinwu [2962 6855 3768]

ORG: Both of Chongqing Research Institute of Special Steel

TITLE: "Research on Heat Treatment of New High Speed Steel W6Mo5Cr4W2Al"

SOURCE: Beijing JINSHU RECHULI [HEAT TREATMENT OF METALS] in Chinese No 5, 81
pp 29-34

ABSTRACT: Due to the fact that W6Mo5Cr4W2Al steel can easily oxidize and decarbonize, during annealing, protective measures, such as protective gas or a sealed box, must be adopted. When it is heated in a saline bath furnace, the saline solution must be properly deoxidized. Due to the fact that it can easily overheat to cause the sizes of the crystalline grains to be uneven, the maximum temperature for quenching should not exceed 1240°C. The isothermal annealing technique and minimum temperature quenching are recommended. Due to the fact that the critical point is relatively high ($Ac_1 = 835-885^\circ\text{C}$), a relatively high temperature ($890-920^\circ\text{C}$) annealing is recommended. Within the temperature range of 950-1150°C, the W6Mo5Cr4W2Al steel is found to have good thermoplastic property. It is preliminarily concluded that a bainite treatment can improve the toughness of this steel.

6248
CSO: 4009/392

Modernization

AUTHOR: LAN Tian [5663 1131]

ORG: None

TITLE: "Microorganisms Purify Sewage"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 6, 16 Jun 81 pp 14-16

ABSTRACT: Chemical, physical and biological methods can be used in the purification of sewage. The former two methods entail the risk of producing secondary pollution, a risk that is not presented by biological methods. In these biological methods, a range of microorganisms are capable of converting poisonous organic compounds present in sewage into harmless substances. Various soil irrigation methods rely on the ability of soil microorganisms to purify sewage that is percolated through the soil or run along its surface. In biological filtering, thin films of microorganisms attached to a filter material oxidize organic pollutants; their activity is helped by other microorganisms present in the filters. In the rotating disk method, disks rotating vertically in sewage troughs bring microorganisms alternately into contact with the sewage and the air. Biological oxidation ponds are a major antipollution approach, and were successfully employed on Yar Lake, Hubel. An anaerobic method, the methane fermentation method, not only is successful in treating sewage with high organic content, but also produces methane which is usable as a fuel.

AUTHOR: TONG Yin [2717 7299]

ORG: None

TITLE: "A Radar-Destroying Thunderbolt: The Anti-Radar Guided Missile"

SOURCE: Beijing XIANDAIHUA [MODERNIZATION] in Chinese No 6, 16 Jun 81 pp 18-19

ABSTRACT: Although radar can be thwarted by chaff or electronic countermeasures, it is most effective to put it out of action by destroying the station itself. Fire control radars, which present the greatest threat to aircraft, are the easiest for antiradar missiles to home on. The warheads destroy the antenna horns, waveguides, reflectors and rotation mechanisms, using various fuse types such as doppler shift and amplitude comparison mechanisms. Seeker heads compute the difference between the missile's heading and the direction to the emitter and issue course correction signals to the flight control mechanisms. The missiles must be launched at a high angle so as to avoid being decoyed by secondary reflections from the ground surface. To deal with intermittent signals from rotating radars, program-controlled guidance is used in midcourse, and the seeker systems are used only for terminal guidance. Western antiradar missiles have included the Shrike, Standard and Matra. Some technical advances are: replaceable seeker heads, additional IR terminal guidance, making it possible to find radars even if they are suddenly turned off, directional memory devices, and seekers which home on any radiation, not merely that of radar antennas.

Oil Geophysical Prospecting

AUTHOR: WU Liexu

ORG: None

TITLE: "The Principle and Application of the Sign Bit Processing Method"

SOURCE: Baoding SHIYOU DIQIUWULI KANTAN [OIL GEOPHYSICAL PROSPECTING] in Chinese No 3, 1981 pp 16-24

TEXT OF ENGLISH ABSTRACT: In this paper, the possibility of recovering the amplitude from the sign bit record is proved by the analysis of noise. The method and effect of the sign bit horizontal stack are also introduced. Some experiments show that the sign bit horizontal stack method emphasizes the coherence of reflections, thus enhancing weak reflections on the section. It is pointed out in this paper that with the development of the sign bit technique, methods which were considered too difficult to employ in the past may now be taken advantage of.

AUTHOR: CHEN Wenhua

ORG: None

TITLE: "Audio-frequency Magneto-telluric Method and the Direction of Future Study"

SOURCE: Baoding SHIYOU DIQIUWULI KANTAN [OIL GEOPHYSICAL PROSPECTING] in Chinese No 3, 1981 pp 62-74

TEXT OF ENGLISH ABSTRACT: This paper features the development of the audio-frequency magneto-telluric method both in and outside China, and discusses briefly the characteristics of the audio-frequency magneto-telluric field and the principle of the method. Equipment needed is listed and examples of its application are given. A tentative proposition is put forward for future research on the method.

AUTHOR: MA Mingde

ORG: None

TITLE: "A Comment on the Wave Equation Migration Method"

SOURCE: Baoding SHIYOU DIQIUWULI KANTAN [OIL GEOPHYSICAL PROSPECTING] in Chinese
No 3, 1981 pp 75-77

TEXT OF ENGLISH ABSTRACT: A study of the propagation of seismic waves shows that the wave equation migration method currently used neglects the influence of phase characteristics. Also, the parabolic type equation commonly used now is derived from the hypothetical conditions of ray theory, so it is not complete with respect to the nature of waves. This is precisely why the results of wave equation migration are presently less than ideal.

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CSO: 4009/361

Scientific Instruments

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TITLE: "The Design and Adjustment of a DX-4 Transmission Electron Microscope"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese No 2, 1981 pp 1-9

TEXT OF ENGLISH ABSTRACT: When we were designing our microscope, we had in mind a short, compact 100 kV high resolution basic instrument with future expandabilities. The main specifications are: $f_0 = 1.6 \text{ mm}$, $C_s = 1.6 \text{ mm}$, $C_C = 1.5$, $\Delta V/V = 5 \times 10^{-6}/\text{min}$, $(\Delta I/I)_{0b} = 2 \times 10^{-6}/\text{min}$. Factors which contributed in making the column short are: use of a side entry stage, a mini-lens within the iron core of the objective lens to act as the first intermediate lens, and minimizing the focal length of the lenses, the column height being only 1.8 m. The focal length of an objective can be expressed as $f_0/\sqrt{H(D/S)^2} = \left(31 \frac{V}{(NI)^2} + 0.19\right)S$. Taking the derivative and setting of $df_0/NI = 0$, we obtain minimum $f_0 = 0.38\sqrt{S^2 + D^2}$ and $V_r/(NI)^2_{\min} = 0.00613$. For lenses other than the objective we can use the expression for the

[Continuation of YIQI YIBIAO XUEBAO No 2, 1981 pp 1-9]

projector lens. Using similar arguments we obtain $f_{l\min} = 0.774(NI)_m$. $(NI)_m$ can be calculated from the expression $V_r/(NI)_m^2 = 0.0048 + 0.00065 S/D$. The magnetic circuits were designed using model calculations. Different models were used for different parts of the magnetic circuit. The alignment problems of the DX-4 electron microscope are discussed, e.g., measurement of voltage stability. With the sheath of the cable disconnected from the ground and connected to an oscilloscope, a detection sensitivity better than 5×10^{-7} at 100 kV for 20 Hz fluctuations is achieved.

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TITLE: "A Method of Calculating Flux-gate Magnetometer"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 10-17

TEXT OF ENGLISH ABSTRACT: A method of calculating a flux-gate magnetometer excited by a square-wave generator is presented in this paper. It is well known that the main difficulty in calculation is that of non-sinusoidal and nonlinear iron-core circuits. Therefore, the emphasis of this paper is on discussing the solution process of this kind of circuit with a ring-core, to which a square-wave voltage is supplied. Due to a quite high resistor inserted in the excitation circuit, the magnetic modulator is excited by square-wave voltage in form, but is actually excited by pulse current. Moreover, from the condition of the constant current source, the expressions of even harmonic flux have been derived by means of even illustrated analysis. The result shows the peak value of output voltage modulated by the signal field H_0 increases in one direction with H_0 , but decreases in the opposite direction. Therefore, it provides the basis for the use of the peak-difference demodulator.

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TITLE: "A Dual X-ray Dispersive Crystal Spectrometer and Its Fitting to a Scanning Electron Microscope"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 18-24

TEXT OF ENGLISH ABSTRACT: This dual X-ray spectrometer consists of two linear-type full focus dispersive spectrometers for analyzing elements. Each contains two Johann-type crystals, i.e., LiF, PET or TAP, STE (CER). The take-off angle of the X-ray is 30°, the radius of the Rowland circle is 140 mm, and the Bragg angle (2θ) ranges from 25 to 120°. These spectrometers can be equipped on the Chinese DX-3 SEM and turn it into a high-grade EPMA-SEM. In this paper the geometric tolerances of the linear-type curved crystal fully-focusing X-ray wavelength spectrometer have been calculated. The preparation of analyzing crystals, fitting the spectrometer to a SEM, increasing peak intensity of diffraction lines, reduction of background and providing a coaxial optical microscope on the specimen chamber are discussed. The overall geometric accuracy and reproducibility of the spectrometer should be

[Continuation of YIQI YIBIAO XUEBAO No 2, 1981 pp 18-24]

1' and 6" respectively. The resulting performances are as follows: range of detectable elements is from B⁵ (Be⁴) to U⁹². Wavelength resolving power $\Delta\lambda/\lambda$ is $1 \sim 5 \times 10^{-3}$ (Na¹¹~U⁹²) or $1 \sim 5 \times 10^{-2}$ (B⁵~F⁹), spectra of K_{α1}, K_{α2} of Cu, Fe, Ti; VK_{α1}, VK_{α2} and TiF₆ of Ti-6Al-4V alloy can be discriminated, and the limit of detectability is 10^{-3} percent (Na¹¹~U⁹²) to 10^{-2} percent (B⁵~F⁹) order.

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TITLE: "Automatic Measurement of AC Magnetic Properties"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese No 2, 1981 pp 25-34

TEXT OF ENGLISH ABSTRACT: Magnetic parameters of equivalent fundamental frequency, such as complex permeability μ , inductance permeability μ_L , magnetic dissipation factor D_m and quality factor Q, as well as the total core loss P_c, can be measured by the automatic bridge technique. In a bridge circuit, the principle of vector impedance ratio measurement is applied. Fundamental frequency character is obtained by a multiplication device to overcome the difficulty due to the nonlinearity in AC magnetic measurement. Dual-slope A/D conversion method is used for measuring various ratios. With some other auxiliary circuits, parameters of the hysteresis loop, such as maximum induction B_m, magnetizing force H_m, peak permeability μ_p , residual induction B_r, coercive force H_c and squareness ratio B_r/B_m can also be measured with a single instrument. All digital results of measured parameters are displayed or printed in a magnetic unit system for direct reading. Accuracy of measurement is $\pm 1 \sim 3$ percent. Working frequency is from 50 Hz to 5 MHz. Measuring

[Continuation of YIQI YIBIAO XUEBAO No 2, 1981 pp 25-34]

function and range change are controlled by logic circuit. This design automatizes the measurement of all AC magnetic properties and results in convenience in designing an automatic measurement system for magnetic parameters by a microprocessor.

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TITLE: "Fundamental Principle and Design Method of Coil with Magnetic Core for Measuring High Pulse Current"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese No 2, 1981 pp 35-43

TEXT OF ENGLISH ABSTRACT: In this paper, the fundamental principle and design method of a measuring coil with a magnetic core for measuring pulse high current is explained in accordance with general physical laws. The results are given and compared with the orthodox shunt or measuring coil by using an aerated medium (i.e., the Rogowski coil). The method can measure lower pulse current, improve low frequency response and simplify technology. Furthermore, non-constant magnetic permeability μ will not influence the linear relationship between currents under a certain condition. The frequency characteristic and amplitude characteristic of the coil are given. In addition, there are photographs of the measured current waveform, constructional scheme and the advantages of the coil.

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TITLE: "An Investigation of the Analytical Method of Kinematic Characteristics of the Cine Escapement Mechanism"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese No 2, 1981 pp 44-51

TEXT OF ENGLISH ABSTRACT: Due to the wide application of computers, it is possible to make an accurate quantitative analysis of kinematic characteristics of the cine claw escapement mechanism. In this paper, a set of formulas is introduced as a numerical solution for the kinematic characteristics of two types of claw escapement mechanisms using coordinate calculation and vector methods. These formulas can be conveniently programmed. An approximate formula is also introduced with the film guide effect taken into consideration.

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TITLE: "Instrument and Measurement of Pitch Error for Spiral Bevel Gears"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS] in Chinese No 2, 1981 pp 52-65

TEXT OF ENGLISH ABSTRACT: In this paper, a highly precise measuring principle of the pitch error for spiral bevel gears and the new technique used in the instrument are described.

The pitch error is an important item in gear accuracy. Most measurements of the pitch error are carried out by the comparative measuring principle. As the comparative measurement is used for a spiral bevel gear, two feelers cannot be set at the same position in two adjacent corresponding flanks. However, because the pitch errors at various positions of the face width are not equal, the pitch errors in the gear cannot be indicated exactly by the measured data. The absolute measuring principle is employed in our instrument. A precise moire-fringe grating is used. The pitch error can be measured automatically. This instrument is suitable for bevel gears with various reference angles, cylinder gears with various profiles (including shaving cutter, slotting tool) and index plates, etc. δt_z is recorded on a paper chart. The δt_p and δx_t are printed.

[Continuation of YIQI YIBIAO XUEBAO No 2, 1981 pp 52-65]

A frequency multiplier with phase-locked loop is used to obtain 1000 frequency multiplication for the moire-fringe signal so that the quantizing error of the pulse can be reduced. A "multiply Z counter" is used. All kinds of tooth numbers can be measured. The stepless multiplier which is made up of a "multiply Z counter" and a "phase-locked tracking frequency multiplier" may be used for other cases. A special purpose digital computer which consists of decade counters has been developed.

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TITLE: "A Study of a NMR Magnetometer Using Flowing Water"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 66-72

TEXT OF ENGLISH ABSTRACT: This paper describes an experimental instrument of a nuclear magnetic resonance magnetometer using flowing water. The principle, structure and initial experimental results are given in this paper. This instrument can be used to measure not only the strong magnetic field and homogeneous field, but also the weak magnetic field, the range of which is from 300 down to 0.023 Gausses, accurately. It can also be used to measure non-homogeneous magnetic fields.

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TITLE: "Some Corrections for the Measurement Method of Series Resonance"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 73-83

TEXT OF ENGLISH ABSTRACT: The problem of how to measure the true inductance L_x and the true quality factor Q_x of the inductor by means of the measurement method of series resonance has been considered. The respective formulas, by which L_x and Q_x are calculated according to different measurement modes, are given and their validity confirmed by the experiments. The results show that the most precise result of L_x and Q_x values may be obtained by combining the series inductor measurement method with the tuning frequency mode.

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TITLE: "The Non η Corrected Side Inclination Method in X-ray Stress Measurement"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 84-94

TEXT OF ENGLISH ABSTRACT: In this paper, a stress calculating formula for non η corrected side inclination method in the measurement of a side declining angle surface sample is introduced. A large systematic error may appear if an ordinary or η corrected side inclination method is used in the stress calculation for the non η corrected side inclination one. The formula is based on some new measuring techniques. In the end, the systematic error may be eliminated or minimized.

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TITLE: "The Analysis of Developmental Tendency of PID Regulator"

SOURCE: Beijing YIQI YIBIAO XUEBAO [CHINESE JOURNAL OF SCIENTIFIC INSTRUMENTS]
in Chinese No 2, 1981 pp 95-106

TEXT OF ENGLISH ABSTRACT: The PID regulator is one of the most important industrial control instruments. It is widely used in industrial production process control. Although it is proved that the current PID regulator is an optimal regulator for processes characterized by $K e^{-Ts}/(Ts+1)$ or $K e^{-Ts}/(T_1 s+1)(T_2 s+1)$, yet it exposes some disadvantages. For example, its functions are incomplete and its turning parameters are coupled with each other. Furthermore, these regulators cannot adapt to nonlinear or time-varying processes. This paper describes an advanced PID regulator from the point of view of classical and modern control theory. There are two features, i.e., its derivative action acts only on the measuring path and not the set point's path; the integral feedback signal is fed externally and not internally. This paper analyzes the adaptability of the regulator to the cascade control system, float-limit control system and override control system for protection from the integral windup. The PID regulator should be improved to suit nonlinear and time-varying processes, and it should especially be required to develop diversified function in respect to the nonlinear PID regulator and the adaptive

[Continuation of YIQI YIBIAO XUEBAO No 2, 1981 pp 95-106]

PID regulator. Finally, this paper describes a dual-mode regulator with state-variable dynamic compensation which is very useful for processes with quick response and large disturbance.

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CSO: 4009/304

Seismology and Geology

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TITLE: "Experimental Study on Radon Emanation of Saturated Rock under Ultrasonic Vibration"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 1-7

EXCERPTS FROM ENGLISH ABSTRACT: This paper illustrates an experimental study on the influence of ultrasonic vibration upon the microstructure and emanation process of saturated rocks. It was found by scanning electron microscope observation that specimens under ultrasonic vibration, whether on the ultrasonically irradiated sides or on the non-ultrasonically irradiated sides, all show a large number of fissured traces, i.e., microcracks. Therefore, it can be inferred that under the ultrasonic vibration the development of microcracks provided an outward-diffusing "passage" for the sealed radon to take part in the emanation process.

The experimental results show that the rock emanation process is clearly related to the ultrasonic vibration. Its mechanism is rather complicated. It is reasonable

[Continuation of DIZHEN DIZHI No 2, 1981 pp 1-7]

to consider that prior to the failure of the rock the expansive microcracking produced acoustic emission, i.e., ultrasonic vibration, leading to a constant emanation from rocks in a significant amount which may be regarded as a probable precursory information of radon.

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TITLE: "The Seismicity and Recent Crustal Movement in the Himalayan Region"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 9-21

EXCERPT FROM ENGLISH ABSTRACT: In this paper three aspects of analysis are made for the recent crustal movement in the Himalayas on the basis of earthquake data recorded from 1897-1976.

1. The characteristics of the present active faults in this region were studied by the fault plane solutions.
2. The vectors of the tectonic movement in the lithosphere blocks were calculated by the null vector method.
3. The rate of the crustal slip was estimated from the seismic moment data.
In light of the analysis mentioned above, a model of recent crustal movement in the Himalayas is tentatively presented.

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TITLE: "Continental Rift Valley System and Seismic Activities in Northeast China"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 23-29

TEXT OF ENGLISH ABSTRACT: Northeastern China is restricted by the regional stress field, and within it the NE trending Xialiaohe and Songliao rift valleys have developed. The continental basement is filled with loose clastic sediments of continental facies, from 1000 to 5000 meters in thickness. From the rift borders lava of olivine basalt and hot water springs were ejected, and, as a result, rings were formed as the earthquake-control zones. The mechanism of the rift valley formation could be viewed as a reflection of the underthrusting of the Pacific Plate.

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TITLE: "Preliminary Study of Principal Features of the NW and NWW Trending Fault Structures in the Yanshan Region"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 31-40

TEXT OF ENGLISH ABSTRACT: Based on recent field investigations, the principal features of the NW trending fault structure in the Yanshan region are summarized in this paper.

By analyzing structural, seismological and geophysical data, the authors demonstrate the space distribution, formation, development and movement mode of the NWW trending basement fault zones, as well as their relation to seismicity. It is suggested that the NWW trending fault zone can be attributed to a crustal fault, controlling both the development of the fault block structure and recent seismicity. The fact that the NW faults spread en echelon and cluster into a zone is an indication of a NWW fault zone in the superficial strata. Moreover, the movement mode of the zone under investigation has a very close relationship with the relative motion of the

[Continuation of DIZHEN DIZHI No 2, 1981 pp 31-40]

fault block structures. Since Mesozoic and Cenozoic periods, in addition to the differential movement, this fault zone was of a shearing motion which had very obvious physical changes during the periods from the Late Cretaceous to Early Tertiary.

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TITLE: "On the Seismogeological Characteristics of the 1976 Songpan-Pingwu Earthquakes"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 41-47

TEXT OF ENGLISH ABSTRACT: This paper discusses the seismogeological background of the Songpan-Pingwu earthquakes, their seismicity, the characteristics of tectonic stress field and the conditions of the seismogenic structures in the region under investigation.

Judging from the location of the epicenters of three strong shocks along the Huya fault, the contour of their synthetic isoseismals and the agreement of fault plane solutions with the occurrence of the Huya fault, the authors have come to a preliminary conclusion that the events studied were caused by the dip-slip displacement of the NNW trending Huya fault with a slightly sinistral component and under the action of the nearly EW trending tectonic stress field.

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TITLE: "Tectonic Conditions of the Occurrence of Strong Earthquakes in Shandong Province"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 49-56

TEXT OF ENGLISH ABSTRACT: From the analysis of the distribution of strong earthquakes, the deep-seated crustal structures and average conditions, the authors of this paper attempt to divide the faults within the earth's crust into six groups and to estimate the depth and characteristics of seismo-pregnant layers. The motion of upper mantle materials, faulting and seismicity are a common source-contemporaneous. The occurrence of strong earthquakes is directly controlled by the activities of both deeply penetrating faults and faults of basaltic layers.

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TITLE: "Some Features of Contemporaneous Faults in the Beijing Plain and Their Significance"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 57-64

TEXT OF ENGLISH ABSTRACT: From the data obtained from the seismogeological work in the Beijing plain, the authors consider all of the main active faults in this region to be of contemporaneous nature and originated at the same time as the deposition took place. In our opinion, the study of contemporaneous faults is of great significance. At the end of this paper a general morphological model for contemporaneous faults is presented.

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TITLE: "On Neotectonics of the Hunhe Fault Zone"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 65-68

TEXT OF ENGLISH ABSTRACT: The Hunhe fault zone is a western extension of the Shenyang-Dunhua Mishan fault and there can be found evidence of Pre-Sinian movement. It is suggested that the faulting of the Hunhe fault zone was significant in Mesozoic time and more intensive and frequent in the Tertiary and Quaternary.

Based on geologic, morphologic and seismic data, this paper illustrates a tracing of the neotectonic movement since the Tertiary. Actually, this fault acts as one of the main faults of the Cathaysian tectonic system. In general, this paper deals only with the Shenyang-Qingyuan section.

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TITLE: "Brief Report on the 'Symposium on Tancheng-Lujiang Fault Zone'"

SOURCE: Beijing DIZHEN DIZHI [SEISMOLOGY AND GEOLOGY] in Chinese No 2, 1981
pp 69-80

EXCERPT FROM ENGLISH ABSTRACT: The Symposium on the Tancheng-Lujiang fault zone held at Weifang, Shandong Province, on 1-10 November 1980, was organized by the Geological Society of China, accompanied by a field trip. The problems of regional geological investigations, exploratory survey for ores, geophysical prospecting, seismogeology and image interpretation have been thoroughly discussed.

All representatives came to the following common understanding: (1) The Tancheng-Lujiang fault zone is a gigantic fault zone in east China, related to the formation of ores and earthquakes; (2) this fault zone has been subjected to a complex process in formation and evolution with a great variety of motive modes at different stages and periods and is characterized by the complicated geomechanical nature of compressive shear and tension, on the one hand, and of left-lateral and right-lateral displacement on the other; (3) it is a fault zone that is still active at present.

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